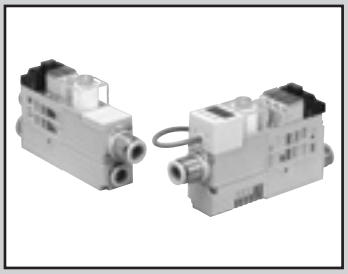


Vacuum switching unit ideal
for controlling large flow rate vacuum pressure

VSQP Series

RoHS

Features

■31.5mm width vacuum unit ideal for large flow rate control.

■A wide range of vacuum supply valves (normally open, normally closed) are available.

■An easy-to-read 2-screen digital display pressure sensor is available for the pressure sensor.

■The minus common specification can be selected when the minus side of the power supply is used as a common reference potential.

Specifications

Descriptions	VSQP
Working fluid	Air
Working pressure MPa	0.3 to 0.7
Ambient/fluid temperatures °C	5 to 50
Vacuum pressure kPa	-100 to 0

Solenoid valve specifications

● Pilot valve

Descriptions	Pilot valve	
Valve and operation	Direct acting poppet valve	
Rated voltage V	24 DC	100 VAC
Voltage fluctuation range V	24 DC±10%	100 AC±10%
Surge suppressor	Varistor	Bridge diode
Power consumption	0.55 W	1VA
Manual override	Push locking	
Operation display	At coil excitation operation: Red LED lights	

● Switching valve

Descriptions	Vacuum supply valve	Vacuum break valve
Valve and operation	Pilot operated poppet valve	
Valve	Normally closed, normally open	Normally closed
Lubrication	Not required	
Effective cross-sectional area mm^2(Cv)	16.5 (0.89)	3.5 (0.19)

Vacuum pressure switch specifications

Descriptions			Vacuum pressure switch	
			NPN output (R)	PNP output (RP)
Working pressure		kPa	-100 to 100	
Proof pressure		kPa	500	
Environmental resistance	Ambient temperature (in storage)	°C	-10 to 60 (no condensation or freezing)	
	Ambient temperature (in use)	°C	0 to 50 (no condensation or freezing)	
	Ambient humidity (in storage/in use)		35 to 85% RH (no condensation)	
	Degree of protection		IEC standards IP40 or equivalent	
Power supply voltage		V	12 to 24 DC±10% ripple (P-P) ±10% or less	
Current consumption		mA	40 or less (no load)	
Pressure display	Display frequency		5 cycles/second	
	Display accuracy		±2%F.S. ±1digit	
	Digital display		Main display: 2 colors (red, sub-display: orange)	
Switch output	No. of output points		2 points	
	Output method		NPN open collector	PNP open collector
	Switch rating		30 VDC, 125 mA or less	
	Internal voltage drop		1.5 V or less	
Temperature characteristics			±2%F.S. or less (0 to 50°C, at25°C)	
Repeatability			±0.2%F.S. ±1digit	
Hysteresis			Adjustment is possible	
Responsivity			Selectable (50/250/500/1000/2000/3000 ms)	

Vacuum filter specifications

Descriptions		Vacuum filter
Element material		PVF (Polyvinyl formal)
Filtration rating	μm	10
Filtration area	mm^2	1507
Replacement filter element model No.		VSQ-E

Vacuum burst function

Descriptions	Vacuum burst function
Break air flow rate ℓ/min (ANR)	0 to 50 (at supply pressure 0.5 MPa)

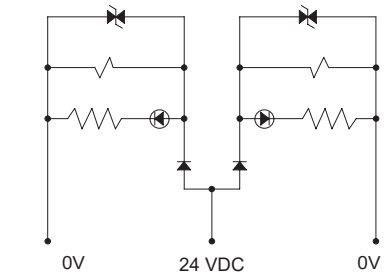
Valve lead wire color

Descriptions	Black	Gray	Blue	Brown
24 VDC plus common specifications	Vacuum generation (-)	Vacuum burst (-)	- (*1)	24 VDC (+common)
24 VDC minus common specifications	Vacuum generation (+)	Vacuum burst (+)	- (*1)	0V (-common)
100 VAC specifications	Vacuum generation (-)	Vacuum burst (-)	- (*1)	common

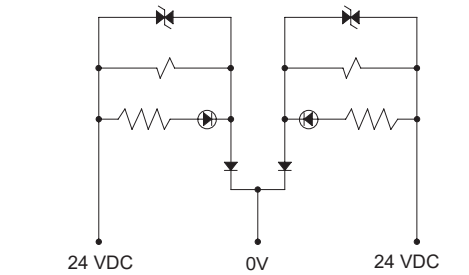
*1: For this model, the attached blue lead wire is not used.

Electric circuit (solenoid valve)

●24 VDC

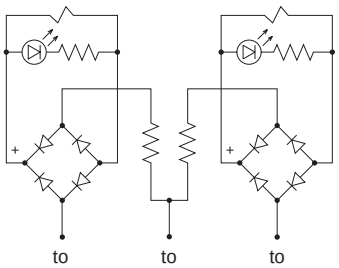


Plus common specifications



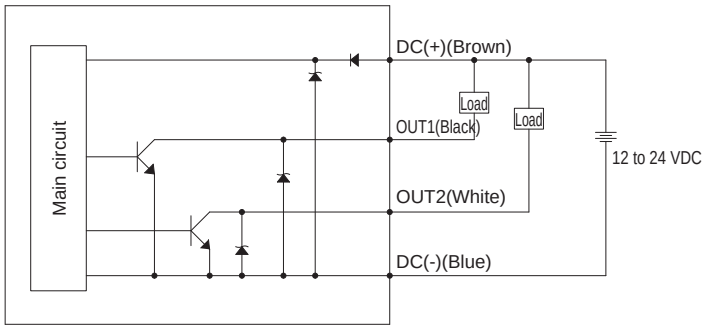
Minus common specifications

●100 VAC

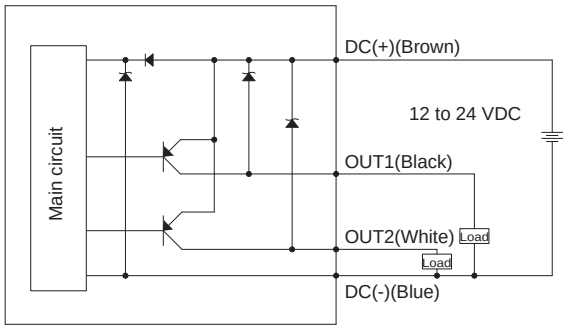


Vacuum pressure switch electric circuit diagram

■ NPN open collector output

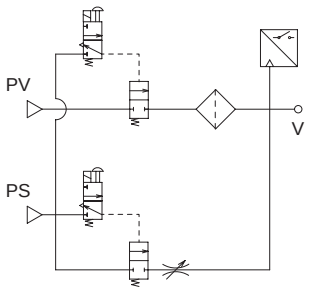


■ PNP open collector output



Circuit diagram

● Normally closed



How to order

● 31.5mm width discrete dedicated vacuum switching unit

VSQP - B 10 10 - 3 - R

- Ⓐ Valve
- Ⓑ Vacuum port (V)
- Ⓒ Vacuum supply port (PV)
- Ⓓ Solenoid valve voltage
- Ⓔ Vacuum pressure switch specs.

Code	Description
Ⓐ Valve	
A	Normally open (NO)
B	Normally closed
Ⓑ Vacuum port (V)	
10	ø10 push-in fitting
12	ø12 push-in fitting
Ⓒ Vacuum supply port (PV)	
10	ø10 push-in fitting
12	ø12 push-in fitting
Ⓓ Solenoid valve voltage	
1	100 VAC
3	24 VDC (plus common specifications)
3MC	24 VDC (minus common specifications)
Ⓔ Vacuum pressure switch specifications	
Blank	Without vacuum pressure switch
R	With digital display, NPN output 2 points
RP	With digital display, PNP output 2 points

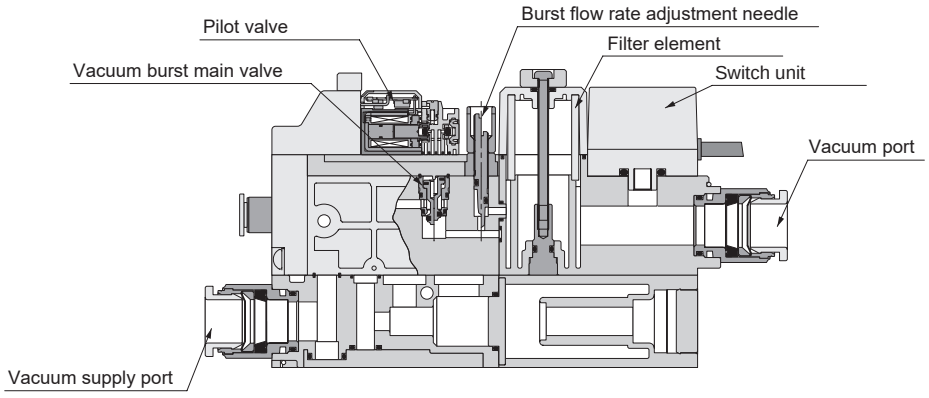
● Maintenance part model No.

・Filter element

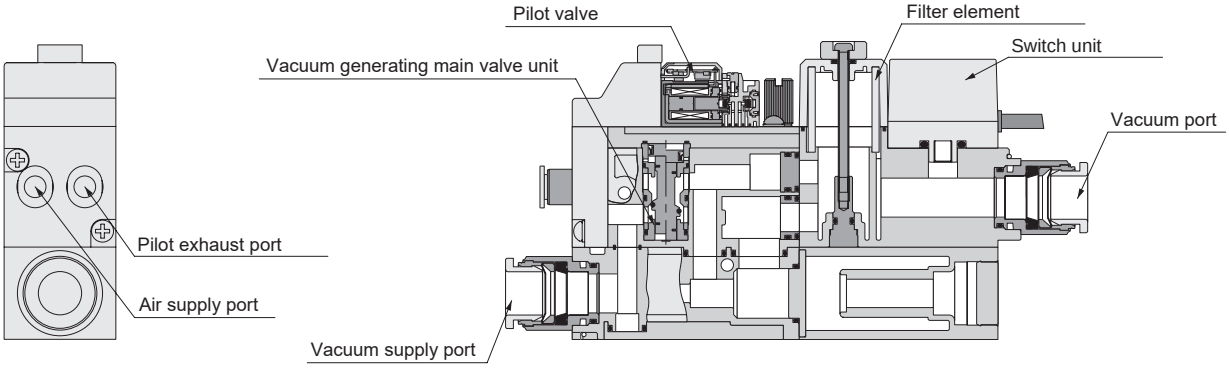
VSQ-E

Internal structure

● Burst circuit

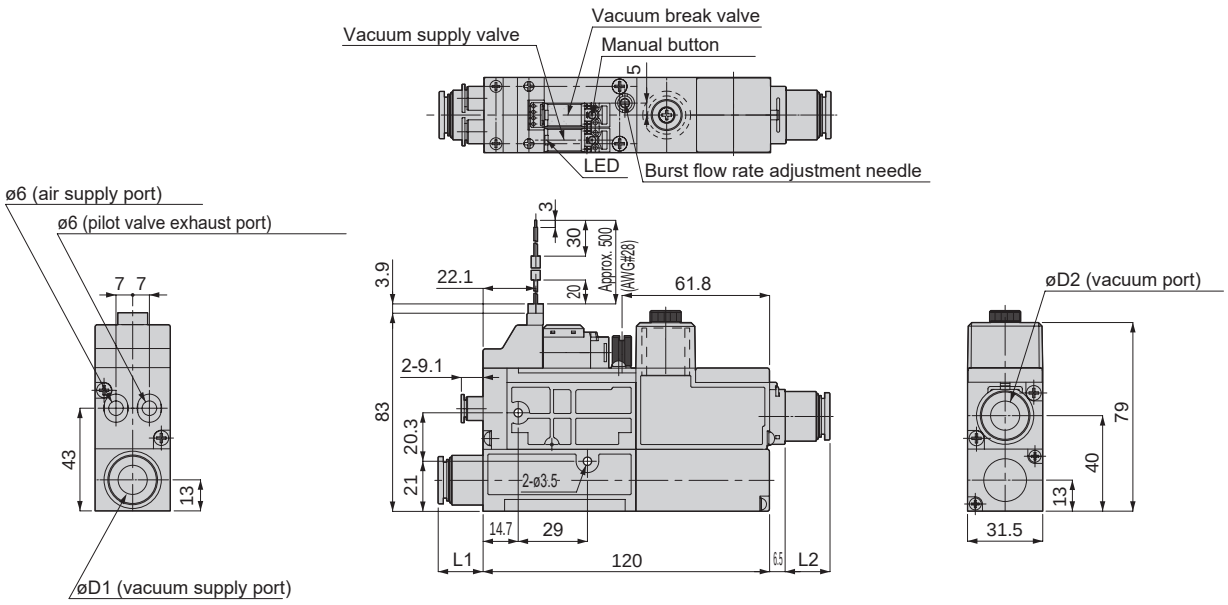


● Vacuum circuit



Dimensions

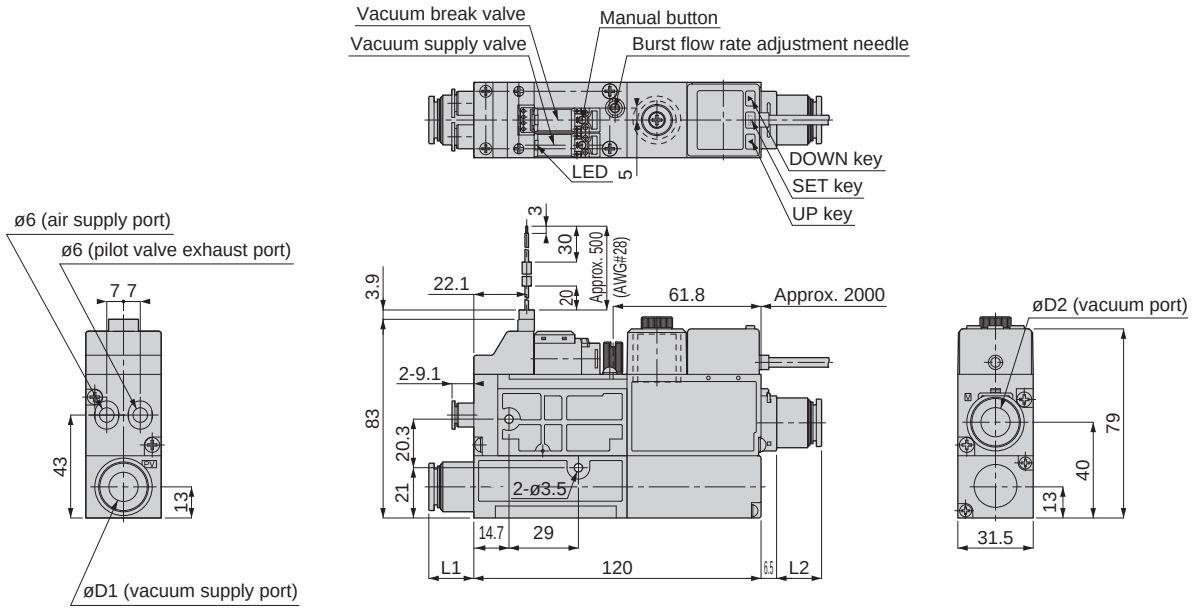
● Without vacuum pressure switch



Unit: mm

	Tube O.D. øD1	L1	Tube O.D. øD2	L2
Air supply port	10	14.7	-	-
	12	18.8	-	-
Vacuum port	-	-	10	14.7
	-	-	12	18.8

● With vacuum pressure switch and digital display



Unit: mm

	Tube O.D. øD1	L1	Tube O.D. øD2	L2
Air supply port	10	14.7	-	-
	12	18.8	-	-
Vacuum port	-	-	10	14.7
	-	-	12	18.8

Safety precautions

Refer to Intro Pages 15 and 16 for general precautions on vacuum system components.

⚠ WARNING

- Since the operating temperature is 5 to 50°C, do not use it under any other temperature conditions.
- If energization to the pilot valve continues for long periods, heat is generated from the coil. Heat could cause burns and impact peripheral devices. Contact the nearest CKD Sales Office if continuously energizing for long periods.
- When operating the valve, make sure that the current leakage is 1 mA or less. Otherwise, there is a risk of malfunctions caused by current leakage.
- The vacuum retention function of the vacuum switching unit allows leakage. Hence, take other safety measures if vacuum retention for long periods is required.
- Do not use in atmospheres or gases containing corrosive substances.
- Do not use in flammable or explosive gases, liquids, or atmospheres. This risks causing fire or explosion, as the product does not have an explosion-proof structure.
- Do not use where the heat generated exceeds the operating temperature range. It risks damaging the switch.
- Make sure to turn the power OFF before wiring. During wiring, check the lead wire color, terminal No., etc. and do not short-circuit the output terminal and power supply terminal or common terminal. Short-circuiting could cause sensor malfunction.

⚠ CAUTION

- Compressed air contains a large amount of drainage (water, oil oxides, tar, foreign matter). Since drain significantly reduces performance, dehumidify with after-cooler and dryer to improve air quality.
- Do not use a lubricator.
- As rust and the like inside the piping may cause malfunctions, be sure to insert a filter of 5 μm or less in front of the supply port. In addition, flushing of pipes is recommended before use and at appropriate intervals.
- Do not apply high tensile force or bending force to the pilot valve or vacuum pressure switch lead wire. It could cause disconnection or damage to the connector unit.
- Avoid using in areas containing corrosive or flammable gases. Do not use as a fluid.
- This product does not have a drip-proof/dust-proof structure. Do not use in places where the product is exposed to dripping water, oil, dust, etc.
- Avoid as far as possible the suction of dust, salt, iron powder and the like.
- When vacuum is generated, do not operate the vacuum burst valve.
- When replacing the supply and vacuum port cartridge fittings, remove the deposits from the seal and then securely insert the pin.
- Keep the piping of vacuum, common exhaust, pilot exhaust and supply as short as possible. Due to piping resistance, the original performance of the vacuum components may not be fully attainable.
- Use a stable DC power supply.
- To connect to an output terminal or power supply terminal (relay, valve, etc.), install a surge voltage absorption circuit. Avoid applications that exceed the rated current.
- When using a unit power supply such as switching power supply, ground the F.G. (frame ground).
- Do not short-circuit the output terminal with other terminals.
- Do not apply excessive load to the body. It may cause damage.

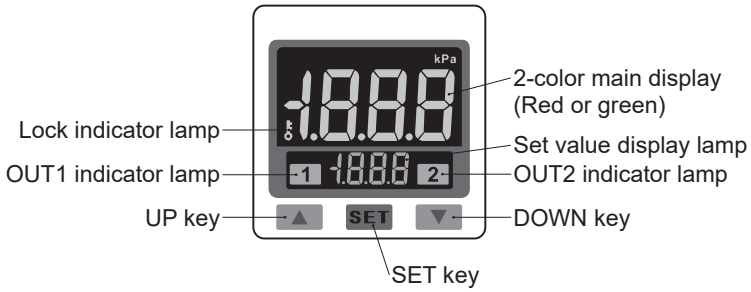
Usage methods

1. How to operate the valve

- Energization (supply power after confirming the wiring.)
- Energize the lead wire (black: vacuum, gray: vacuum burst) of the solenoid valve that you want to operate. The valve will operate.

2.Usage methods of the pressure sensor

The names and functions of each part



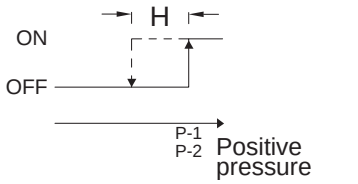
Switch output

Switch output operation can be selected from below.

- One-point setting mode
- Hysteresis mode
- Window comparator mode

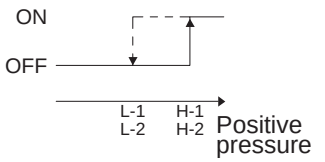
Normally open mode

Compound pressure
VUS-33R



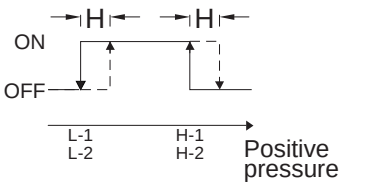
Normally open mode

Compound pressure
VUS-33R



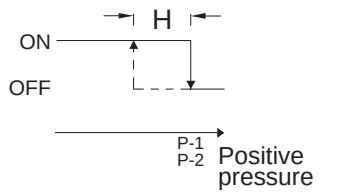
Normally open mode

Compound pressure
VUS-33R



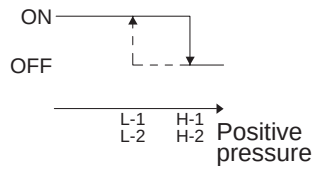
Normally closed mode

Compound pressure
VUS-33R



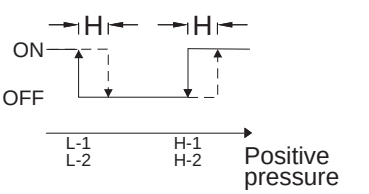
Normally closed mode

Compound pressure
VUS-33R



Normally closed mode

Compound pressure
VUS-33R



*1. When the hysteresis is set to 2 digits or less, if the input pressure is very close to the set pressure, malfunction may occur in the sensor output.

*2. In the window comparator mode, if the two set points are smaller than the fixed hysteresis set value, the switch output may not operate.

Usage methods

Hysteresis setting

Hysteresis setting helps prevent chattering due to pressure pulsation, etc.

Response time

Response time of the switch output can be set.
Setting the response time helps prevent erroneous detection due to unexpected pressure fluctuations.

Changing the display color

The display color when the switch output is ON/OFF can be set from red and green.

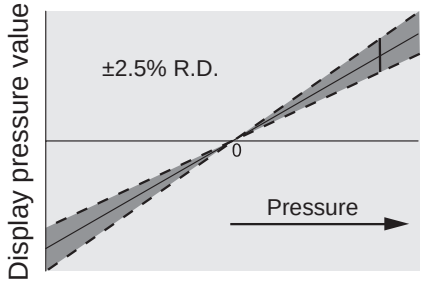
Power saving mode

This function switches to the power saving mode if no button is pressed for 30 seconds.
Operate any button while in power saving mode to return to measurement mode.

Fine adjustment mode

This function allows fine adjustment of the displayed value within ±2.5% range.
It unifies variations in the display value when using multiple pressure sensors.

This function eliminates small pressure errors in the output value and makes the displayed value uniform.
The value displayed on the pressure sensor can be set within ±2.5% R.D.



— The initial setting is the value set at the factory (factory setting).
Pressure setting display value - Allowable setting range

R.D. (Real Detect measured value)
* Setting resolution: ±0.1% R.D.

How to use

Zero value setting

This function forces the display pressure to be set to zero.
If a pressure of more than ±3% of atmospheric pressure is applied, an error message will be displayed and the unit will be disabled.

Maximum/minimum value display

This function displays the maximum and minimum pressure values since the power was turned ON.
The values are reset when the power is turned OFF.

Button lock/unlock mode

The lock function mode is used to lock the keys and prevent erroneous outputting of the switch due to an incorrect key being pressed. When the button is locked, a key symbol appears on the main display.

Error display description

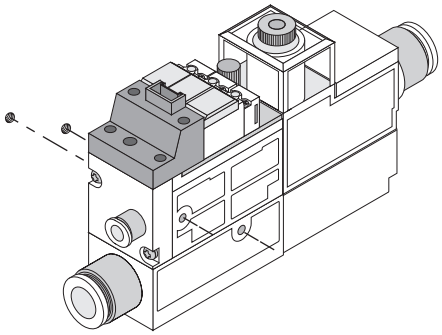
Error name		Error display	Description	Processing method
Overcurrent error	out1	Er 1	The load current of output 1 exceeds 125mA.	Turn OFF the power and check the cause of the overcurrent. Next, lower the load current to 125mA or less and then turn ON the power again.
	out2	Er2	The load current of output 2 exceeds 125mA.	
Residual pressure error		Er3	At zero clear setting, the atmospheric pressure is ±3% F.S. or more.	Perform zero clear operation again after setting the applied pressure to the atmospheric pressure state.
Working pressure error		HHH	The applied pressure exceeds the upper limit of the pressure setting value.	Adjust applied pressure to within the working pressure range.
		LLL	The applied pressure exceeds the lower limit of the pressure setting value.	
System error		Er4	Internal system error	Turn OFF the power and then turn it ON again. If the error is not resolved, contact us.
		Er5		
		Er6	Internal data error	
		Er7		

Note) Refer to the instruction manual included with the product for details on setting each function.

Usage methods

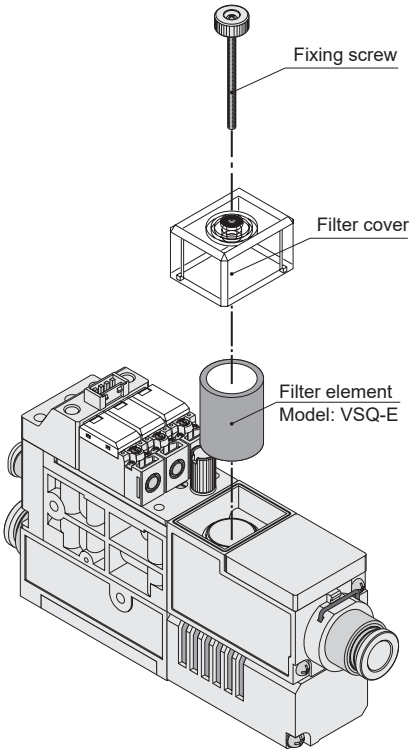
3. Fixing method

To secure the vacuum unit VSQP, fasten M3 screws through the fixing holes on the resin body. (Refer to the dimensions for the fixing hole pitch.)



4. How to replace the filter element

Remove the fixing screws to replace the filter element. After replacing the filter element and checking that the filter packing has not fallen out, securely fix it with tightening torque of 0.3 to 0.5 N·m.



Usage methods

5. How to replace the cartridge fitting

Cartridge fittings can be replaced according to the following procedure.

(1)Pull out the stop pin with a flathead screwdriver, etc.

(2)Pull out the cartridge in the connection direction.

(Note) When mounting the cartridge to the body, mount after checking that there is no dirt, fluff, etc. adhering to the O-ring.